Influence of Smartphone Usage, Sleep Quality and State Self-Esteem on Depression, Anxiety and Stress of Adolescents

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Abstract: Adolescence is one of the rapid phases of human development; it represents a period of intense growth and change in almost every aspect of a child's biological, cognitive, social and emotional life. In today's world, these essential ingredients for growth and change are primarily negatively impacted by new technologies and devices. Researchers have found that psychological stress is one of the major problems of today. Therefore, the present study aimed to identify the influence of smartphone use, sleep quality, and self-esteem on depression, anxiety, and stress in adolescents. Smartphone Addiction Scale, Pittsburgh Sleep Quality Index, State Self Esteem Scale, DASS 21- Depression Anxiety Stress Scale were used to collect data from 164 adolescents, including 62 boys and 102 girls. An ex post facto research design and a convenience sampling procedure were used to collect the data. After the data were found to be normally distributed, parametric statistics such as Pearson's correlation and Regression were used. The results of the study showed that smartphone usage and sleep quality are risk factors for depression, anxiety and stress. In addition, social self-esteem was found to be a protective factor for depression and anxiety. Therefore, this research emphasizes the negative consequences of smartphone addiction and poor sleep quality. In addition, importance must be attached to social self-esteem during adolescence, which helps them reduce psychological distress.

Keywords: Smartphone Usage; Sleep Quality; State Self-Esteem; Depression; Anxiety; Stress.

INTRODUCTION

Due to rapid urbanization, most parents work, leaving less time to care for their children, especially during the precarious phase of adolescence. Owing to lack of parental supervision, teens are seeking pleasure and engaging in risk-taking, and one of them is excessive smartphone use. Smartphone addiction has become a major problem over the past decade (Lee & Lee, 2017) and is growing rapidly among youth in Asia (BBC, 2015). The user can potentially access the internet anywhere and anytime via smartphones, thus increasing the usage of applications like Instagram, Facebook and Twitter etc. Further, it has become one of the most important academic and leisure tools for teenagers and young adults. Excessive smartphone use among teenagers and young adults can lead to many problems such as low academic achievement, interpersonal distress and maladjustment of school life, sleeping disturbance, and psychological distress. Studies also reported that smartphone usage was associated with depression and anxiety (Demirci *et al*., 2015; Hwang *et al*., 2012).

While modernization and exposure to media and technology are beneficial on the one hand, they are also a risk factor for irregular sleep patterns, poor sleep quality and sleep-related problems, especially during puberty. There is growing evidence of the association between social media use and various aspects of adolescent well-being, including sleep and mental health (Espinoza, 2011; Pantic *et al*., 2012). Sleep is considered an important factor in the growth, maturation and health of children and adolescents (Cao *et al*., 2015). Insufficient sleep in adolescents can lead to other problems such as poor physical activity and more digital screen exposure and other undesirable actions. Sleep was also found to be one of the preceding factors for depression and other emotional difficulties (Baglioni *et al*., 2010; Goldstein & Walker, 2014; O'Leary *et al*., 2018; Tsuno *et al*., 2005).

Adolescence is a vulnerable time when individuals are subject to low self-esteem (McGee & Williams, 2000) and the onset of anxiety and depression (Orth *et al*., 2008). Studies have described the link between social media use and self-esteem. It is noted that positive or negative feedback on their online site can correspondingly increase or decrease self-esteem (Valkenburg *et al*., 2006). A crucial aspect of children's and adolescents' overall health is their mental health, or their ability to perform successfully concerning their thoughts, feelings, and behaviours. In the current circumstances, psychological and behavioural problems are increasing. There is

evidence of an increase in mental health problems among children and adolescents (Tao *et al*., 2017). Global studies show that the prevalence of behavioural and emotional problems in adolescents ranges from 16.5% to 40.8% and in India from 13.7% to 50% (International Institute for Population Sciences, 2007). Therefore, mental health problems are considered to be one of the main causes of health-related disabilities in this age group.

Distress is a major problem and it is widely used as an indicator of population mental health in public health, population surveys and epidemiological studies, and as an outcome in clinical trials and intervention studies. According to research studies, the use of electronics has been mentioned as one of the strongest indicators of sleep disorders; drowsiness or poor sleep hygiene (such as sleep delays, sleep duration, sleep patterns, and sleep quality). These disorders have also been found to be associated with psychological symptoms (Tao *et al*., 2017). Social media use and poor sleep were reported to contribute to anxiety, depression and low self-esteem (Alfano *et al*., 2009). Based on these research shreds of evidence and facts, a study was conducted to identify the influence of smartphone usage, sleep quality and state self-esteem on depression, anxiety and stress of adolescents.

HYPOTHESES

1. Smartphone usage would be positively related to the poor sleep quality of adolescents.
2. Smartphone usage would be negatively related to the state self-esteem of adolescents.
3. Poor sleep quality would be negatively related to the state self-esteem of adolescents.
4. Smartphone usage would be positively related to depression, anxiety and stress of adolescents.
5. Poor sleep quality would be positively related to depression, anxiety and stress of adolescents.
6. State self-esteem would be negatively related to depression, anxiety and stress of adolescents.

METHOD

PARTICIPANTS

The sample consists of 164 adolescents, 62 boys and 102 girls, from 4 schools located in Chennai. The age range of the chosen sample was 13 to 18 years. The examination were scheduled for the students and so many schools were not permitting to collect data and therefore, a convenience sampling technique was used to collect the data. Schools were chosen based on proximity and through references. Permission was sought from the higher authorities of the school after which the date and time were fixed with the concerned teacher and the data were obtained from the students after obtaining their consent.

TOOLS

The Smartphone Addiction Scale (SAS) by Kwon *et al*. (2013) is a 33-item, six-point Likert scale based on the internet usage scale and the features of smartphones. It is used to identify the level of the smartphone usage risk and to distinguish the high-risk group in adolescents. A higher score indicates more serious smartphone usage.

Pittsburgh Sleep Quality Index by Buysse *et al*. (1989) has been used to assess sleep quality and disturbances over a 1 month time interval. The questionnaire consists of 19 self–rated questions and 5 questions rated by the bed partner or roommate. Only self-rated questions are included in the scoring. Higher the score severe difficulty in the sleep quality.

State Self-Esteem Scale by Heatherton and Polivy (1991) was designed specifically for measuring state self-esteem, which is defined as the temporary fluctuations in self-esteem. The State Self-Esteem Scale (SSES) consists of 20 items. It has 3 correlated factors: performance, social, and appearance self-esteem. Sum scores of the sub-components to obtain the total of state self-esteem.

DASS 21- Depression Anxiety Stress Scale by Lovibond and Lovibond (1995) is a self-reporting tool designed to measure psychological distress along with the constructs of depression, anxiety, and stress. It is rated on a four-point Likert scale, each item is scored from 0 to 3.

RESULT AND DISCUSSION

Table 1 shows the inter-correlations between the independent variables (Smartphone usage, Sleep quality and State self-esteem) and the dependent variables (Depression, Anxiety and Stress). The r-value indicates the relationship between the variables.

Table 1: Inter-Correlations between the Independent Variables (Smartphone Usage, Sleep Quality and State Self-Esteem) and the Dependent Variables (Depression, Anxiety and Stress)

Variables	1	2	3	4	5	6	7	8	9
SPU	1	.421**	-.213**	-.238**	-.203**	-.290**	.373**	.479**	.365**
SQ	-	1	-.120	-.248**	-.191*	-.256**	.459**	.484**	.420**
PSE	-	-	1	.424**	.377**	.778**	-.309**	-.187*	-.198*
SSE	-	-	-	1	.267**	.767**	-.411**	-.340**	-.286**
ASE	-	-	-	-	1	.706**	-.226**	-.173*	-.171*
State self-esteem	-	-	-	-	-	1	-.415**	-.324**	-.304**
Depression	-	-	-	-	-	-	1	.685**	.579**
Anxiety	-	-	-	-	-	-	-	1	.663**
Stress	-	-	-	-	-	-	-	-	1

SPU: Smart Phone Usage; SQ: Sleep Quality; PSE: Performance self-esteem; SSE: Social Self-esteem; ASE: Appearance Self-esteem

The r-value of the variables smartphone usage and poor sleep quality indicates that the variables are positively related. It can be inferred that there is a positive relationship between smartphone usage and poor sleep quality, thereby it is understood that high levels of smartphone usage would increase poor sleep quality. So, hypothesis 1 was accepted. The relationship between the variables smartphone usage and state self-esteem and its dimensions namely performance self-esteem, social self-esteem and appearance self-esteem indicate a negative relationship. It can be inferred that there is a negative relationship between the variables, thereby it is understood that increase in Smartphone usage would decrease state self-esteem, performance, social and academic self-esteem of adolescents. Hence, hypothesis 2 was accepted.

The r-value for the relationship of Sleep quality with state self-esteem and its dimensions namely social self-esteem and appearance self-esteem indicates that sleep quality was negatively related to state self-esteem and its dimensions social self-esteem and appearance self-esteem; and the performance self-esteem were not related to sleep quality and thus, hypothesis 3 was partially accepted. It can be inferred that there is a negative relationship between poor sleep quality and state self-esteem, social and appearance self-esteem. Therefore, it is understood that an increase in poor sleep quality will decrease the level of state self-esteem, social and appearance self-esteem.

The relationship of smartphone usage and sleep quality with depression, anxiety and stress indicate that both smartphone usage and sleep quality were positively related to depression, anxiety and stress. On the other hand, state self-esteem was found to be negatively related to depression, anxiety and stress indicating that when state self-esteem is high, their psychological distress tends to be low. Therefore, hypotheses 4,5 and 6 were accepted.

Table 2: Multiple Regression Coefficient, Beta Value, 't' Value, and Significance Level of the Independent Variables with the Dependent Variable (Depression)

Level of restriction	t	p	Standard coefficients Beta	F	Df	p	R2
Smartphone usage	2.06*	.040	.150				
Sleep quality	4.38**	.000	.318				
State Self-Esteem							
PSE	1.73	.085	-.023	16.56	5,158	.000	.344
SSE	3.19**	.002	-.235				
ASE	.32	.747	-.023				

**p<0.01 * p<0.05 PSE: Performance self-esteem SSE: Social Self-esteem ASE: Appearance Self-esteem

Table 3: Multiple Regression Coefficient, Beta Value, 't' Value, and Significance Level of the Independent with the Dependent Variable of Adolescents (Anxiety)

Level of restriction	t	p	Standard coefficients Beta	F	Df	p	R2
Smartphone usage	4.21**	.000	.303				
Sleep quality	4.31**	.000	.309				
State self-esteem							
PSE	.083	.934	-.006	17.74	5,158	.000	.360
SSE	2.59**	.010	-.188				
ASE	.004	.997	.000				

**p<0.01 * p<0.05 PSE: Performance self-esteem SSE: Social Self-esteem ASE: Appearance Self-esteem

Table 4: Multiple Regression Coefficient, Beta Value, 't' Value, and Significance Level of the Independent Variables with the Dependent Variable of Adolescents (Stress)

Level of restriction	t	p	Standard coefficients Beta	F	Df	p	R2
Smartphone usage	2.46**	.015	.192				
Sleep quality	3.79*	.000	.295				
State Self-Esteem							
PSE	.70	.482	-.057	10.39	5,158	.000	.248
SSE	1.76	.080	-.139				
ASE	.22	.826	-.017				

**p<0.01 * p<0.05 PSE: Performance self-esteem SSE: Social Self-esteem ASE: Appearance Self-esteem

Table 2 shows the findings of regression analysis of the three independent variables smartphone usage, sleep quality, state self-esteem with depression, the dependent variable of the present study. The 't' value indicates that smartphone usage, sleep quality and social self-esteem are significant predictors of depression. However, the other two dimensions of state self-esteem namely performance and appearance self-esteem were not significant predictors of depression. Findings indicate that 34% of depression was explained by smartphone usage, sleep quality and social self-esteem of adolescents.

Table 3 shows the findings of the regression analysis of the three independent variables smartphone usage, sleep quality, state self-esteem with anxiety, the dependent variable of the present study. The 't' value indicates that smartphone usage, sleep quality and social self-esteem are significant predictors of anxiety. However, the dimensions of state self-esteem namely performance and appearance self-esteem were not significant predictors of anxiety. Findings indicate that 36% of anxiety was explained by smartphone usage, sleep quality and social self-esteem of adolescents.

Table 4 shows the regression analysis of the three independent variables smartphone usage, sleep quality, state self-esteem with stress, the dependent variable of the present study. The 't' value indicates that smartphone usage and sleep quality are significant predictors of stress. However, the all three dimensions of the state self-esteem namely performance, social and appearance self-esteem were not significant predictors of stress. Findings indicate that 24.8% of stress was explained by smartphone usage and sleep quality of adolescents.

DISCUSSION

The use of smartphones and other gadgets is increasing day by day. This increase in smartphone usage has been found to be associated with many adverse influences such as physical health problems, emotional problems, sleep disturbances, and academic failures (Ha *et al*., 2007; Lemola *et al*., 2015; Thomee *et al*., 2011). Fobian *et al*. (2016)

found that media use before bedtime and being woken up by a cellphone are associated with lower sleep efficiency in adolescents. Students report that 27% of teens use smartphones at night, which can directly lead to poor sleep quality. Noise or light associated with smartphone use is more likely to increase arousal and make children go to bed later (Cain & Gradisar, 2010). In addition, parental monitoring would be less during night time hours, leaving the possibility of teens using their smartphones late into the night. Because of this, their sleep duration changes and this affects their circadian rhythm, which can be detrimental to the health of the individual.

Looking at the result between smartphone use and social self-esteem, there is a negative relationship between the variables. One study found peer relationships to be an important protective factor in adolescent smartphone use (Bae, 2015). Adolescents are at risk of becoming addicted to smartphones because of their relatively poor impulse control compared to adults and their use of smartphones as a means of managing their social status and emotions (Choi *et al*., 2012). This could be related to the available evidence that a person with low self-esteem tends to use smartphone frequently as it reflects their status and society in the virtual world.

The inconsistent sleeping habits tend to create tiredness and fatigue due to which teens either skip their meals or sometimes overeat without their control. This could lead to a distorted body image, which could be the reason for the negative relationship between sleep quality and self-esteem. Studies reported that poor sleep quality is known to contribute to low self-esteem (Alfano *et al*., 2009), supporting the present finding. Similarly, irregular sleep patterns and excessive use of devices can cause them to withdraw from the physical world, which would have made them disconnected from those around them, and leave them feeling drowsy and drowsy, possibly reducing the time spent on it ignore being with family members. This could be the reason for the negative relationship between sleep quality and social self-esteem.

Although adolescents have poor sleep quality, they also tend to spend time studying and therefore, it is not necessary that sleep quality and performance self-esteem are related. In addition, the researcher observed that they had exams and may have been because their perfomance self-esteem was unrelated to sleep quality since they would have studied during sleep time.

Regression analysis of smartphone use with depression, anxiety, and stress shows that smartphone use is a significant predictor of depression, anxiety, and stress. As people use more technology, especially smartphones, they tend to become engrossed. They cling to these immaterial things and detach themselves from the living environment. This also makes them less concerned about their surroundings. Because of this, they experience anxiety as they do not accept or receive any support or emotional attachment from those close to them. One study also reported that online activities and social media use lead to higher levels of anxiety and depression in adolescents (Yen *et al*., 2009). Individuals also over-rely on these gadgets and get unnecessary information related to diseases, career, health, society etc. which also creates feeling of nervousness and tension. These feelings sometimes prevent them from sharing fear or emotions with others. This could lead to loneliness and that could end in depression.

Inadequate sleep, poor sleep quality, and irregular sleep patterns in adolescents are associated with daytime sleepiness, negative mood, increased likelihood of stimulant use, higher risk behaviors, poor school performance, and increased risk of unintentional injuries (Bakotic *et al*., 2009). Irregular sleep causes teenagers to become inattentive and lose concentration in class, which creates anxiety and also anxiety about the exam. Interest also shifts from academics to recreational activities, sometimes resulting in deviant behaviors such as watching pornography, playing online games, using the internet, etc. These deviations cause them to distance themselves from people, which can also lead to psychological stress.

Social self-esteem has been found to be a significant predictor of depression and anxiety. However, the performance self-esteem and appearance self-esteem dimensions of state self-esteem were not found to be significant predictors of depression and anxiety. Furthermore, not all three dimensions of state self-esteem were found to be significant predictors of stress. During the adolescence, their overall rating is based on the social recognition they associate with their performance and appearance. Based on Elkind's theory (1967), adolescents believe that an audience focuses on their behavior or characteristics and that

the audience is mainly experienced as a potential threat and that they therefore need to maintain their social standing. On the other hand, social self-esteem did not predict stress. This could be due to the fact that social self-esteem during adolescence can make the individual feel anxious and lonely about the situation, but not about the stressful state.

CONCLUSION

The researcher attempted to study the various factors related to depression, anxiety and stress of adolescents. The findings of the study indicated that there was significant relationship between the variables considered in the study, that is, smartphone usage was positively related to sleep quality, and negatively related with state self-esteem and its dimensions namely performance self-esteem, social self-esteem and appearance self-esteem. Smartphone usage and sleep quality were found to be risk factors for depression, anxiety and stress. Social self-esteem was found to be a protective factor of depression and anxiety. Thereby, this research emphasises the negative consequences of smartphone usage and poor sleep quality. Moreover, social self-esteem needs to be given importance during the adolescent phase which helps them to reduce psychological distress.

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